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## PROBLEMS.

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65. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in Irving College, Mechanicsburg, Pennsylvania.

Bought April 4, 1894, 250 yards of broadcloth at \$5.37½ per yard, less 12½ and 10% discount for cash payment. Sold September 5, 1894, at 15, 10, and 5% on *quoted price*, the cloth; and in settlement received a 90-day note which I had discounted at 5½%, October 19, 1894, by the First National Bank of Baltimore, Maryland. Reckoning 6% interest on the *money invested* in the cloth, what is the profit made?

66. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in Irving College, Mechanicsburg, Pennsylvania.

Brown adds  $m=10\%$  of water to the pure wine he buys, and then sells the mixture at a price  $n=10\%$  greater than the cost price of the pure wine. What is his rate per cent. of profit?

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## ALGEBRA.

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Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

## SOLUTIONS OF PROBLEMS.

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62. Proposed by Professor C. E. WHITE, A. M., Trafalgar, Indiana.

Prove that every algebraic equation can be transformed into another equation of the same degree, but which wants its  $n^{\text{th}}$  term.

I. Solution by HENRY HEATON, M. Sc., County Surveyor, Atlantic, Iowa.

To illustrate, let  $x^4 + ax^3 + bx^2 + cx + d = 0$  be any equation of the fourth degree. Put  $x = y + p$ ; then the equation becomes

$$y^4 + (4p + a)y^3 + (6p^2 + 3ap + b)y^2 + (4p^3 + 3ap^2 + 2bp + c)y + p^4 + ap^3 + bp^2 + cp + d = 0.$$

Since we are at liberty to give  $p$  any value, we may give it the value that will make  $4p + a = 0$  or  $-a/4$ ; then will the coefficient of  $y^3$  disappear. It is also evident that we may give  $p$  such a value that any desired coefficient will disappear. It is also evident that to find the desired value of  $p$  by this method requires for the second term, the solution of an equation of the first degree; for the third term, the solution of an equation of the second degree, etc. It is further evident that this is true without regard to the degree of the original equation.